OFA-CCS/CCD Series
1U/2U-Shelf Network Managed Optical Amplifier
User's Manual

June 2014

.

DKTCOMEGA

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1 INTRODUCTION

1.1 About this Manual

This manual consists of six sections. They are; Introduction of the Shelf Type EDFA, System Requirements, Installation, Operation, Testing, and Trouble Shooting. A brief chapter outline of this manual is below.

Chapter 1, The introduction of the Shelf Type EDFA and safety cautions for proper installation.
Chapter 2, How to install the Shelf Type EDFA.
Chapter 3, Panel description.
Chapter 4, Utilizing the LCD and Menu switch operation.
Chapter 5, Interface.
Chapter 6, EDFA Performance check method.
Chapter 7, Maintenance and repair.

1.2 General Descriptions

The Shelf Type EDFA operates in the range of 1550 nm wavelength. The Pump Laser Diode is used as an Erbium Doped Fiber pumping energy source for the EDFA. For better system performance isolators are installed on the input and output of the EDFA's optical terminals. For convenient operation, SNMP, LED indicators, LCD, and Menu functions are assisted. The Shelf Type EDFA is available in a variety of electrical power options such as AC (100V ~ 240V), DC (-48V).

1.3 Mechanical Dimensions and Operational Conditions

The Shelf Type EDFA is installable in a 19" 1U or 2U Shelf.
The size is 432(W) × 375(D) × 44 or 88 (H) mm.
The storage temperature must be kept between -40℃ to 85℃.
The relative humidity range is 10~95%.
The operating temperature range is between 0℃ to 50℃.
The LCD Backlight is assurance between -10℃ to 60℃.

The electrical power consumption depends on the applied use of the EDFA.
For more information about electrical power consumption read the TEST REPORT.

1.4 Precautions for Installation and Warnings

The user must ensure that there is enough air flow and convection through the upper and lower panels.

The Shelf Type EDFA has its own internal circuitry plus an internal electrical voltage converter. Both generate heat. Unrestricted air flow is required for proper operating conditions.

Do not shut-down the input signal when the EDFA is turned on. As the EDFA operates on high current and high optical power condition, any sudden removal of input signal or plugging-out of input signal line may cause fatal damage to the active components in the amplifier. It is recommended to shutdown the laser using ALS-Key before turn-on or turn-off the power switch.

In case of Power Supply Unit(PSU) exchange, make sure to turn off the power switch of the PSU before plug-in (or plug-out) the PSU to (or from) the Amplifier Shelf. In addition,

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it is also strongly prohibited from iterating of power on/off in very shot interval. The recommended on/off interval is at least 5secconds.

The optical adapters for the EDFA input and output are located on the front panel of the Shelf Type EDFA. When received from the factory the optical adapters have a cap on them for safety and protection. Until the Shelf is installed you need to leave the caps on. The operator/user must keep the surface of the optical connecter clean. If the surface of the optical connecter is contaminated with dirt or obstructions the surface of the optical connecter may be damaged as soon as the Laser is turned on.

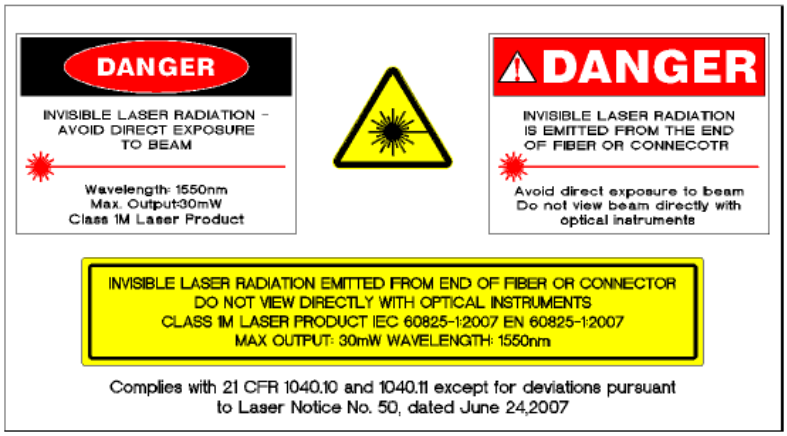
1.5 Grounding Considerations

The Shelf Type EDFA includes Laser Diodes and Photo Diodes those are extremely sensitive to electrical static. You must always handle the EDFA with extra care. When you unpack or install the EDFA you must obey all the ESD (electro static discharge) precautions as well as work with a grounded wrist strap. Therefore, proper ESD precautions are always recommended. To avoid performance degradation or loss of functionality, install in a properly grounded working shelf. The F.G. terminal must be connected to Earth Ground for protection of the unit during installation and operation.
To protect the installation and to prevent unexpected accidents, such as lightning, static electricity, short circuit, surges, etc..., you must use a grounded receptacle for the AC power cord.

1.6 Laser Safety

IEC® 60825 Class 1M laser product.
All versions are Class 1M laser products per IEC 60825-1:2007-03

CAUTION : Use of controls, adjustment, and procedures other than those specified herein may result in hazardous laser radiation exposure.


DANGER
INVISIBLE LASER RADIATION –
AVOID DIRECT EXPOSURE
TO BEAM
Wavelength: 1550nm
Max. Output:30mW
Class 1M Laser Product
DANGER
INVISIBLE LASER RADIATION
IS EMITTED FROM THE END
OF FIBER OR CONNECOTR
Avoid direct exposure to beam
Do not view beam directly with
optical instruments
INVISIBLE LASER RADIATION EMITTED FROM END OF FIBER OR CONNECTOR
DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS
CLASS IM LASER PRODUCT IEC 60825-1:2007 EN 60825-1:2007
MAX OUTPUT: 30mW WAVELENGTH: 1550nm
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant
to Laser Notice No. 50, dated June 24,2007

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2 PREPARATION

2.1 Summary

In this chapter, the first steps of installation after unpacking are covered. The box inventory, basic electrical and optical connections are presented.

2.2 Check the Contents

After unpacking you need to check the contents. The inventory should be as follows:

Table 1. The Inventory of Shelf Type EDFA

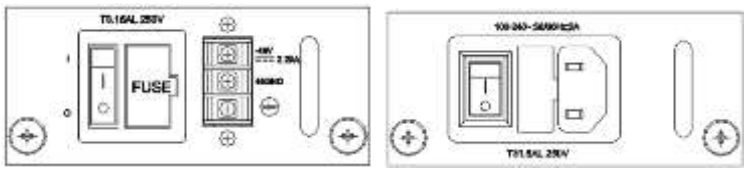
Item	Quantity	Remarks
EDFA Shelf	1	Including EDFA
Instructions manual	1 book	
TEST REPORT	1 booklet	

Inspect the outside of the EDFA.

WARNING: Remember to take all proper grounding precautions.

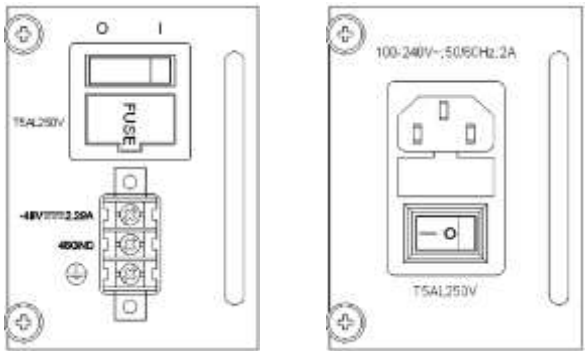
2.3 How to Connect the Power Supply

Figure 1 shows the electrical connectors with the input power terminals on the front panel of the Shelf Type EDFA.
The user must select the applicable power connections for their application and properly connect to the input power terminal.



(DC) (AC)

(a) 1U Shelf



(DC) (AC)

(b) 2U Shelf

Figure 1. Electric Power Supply Connection

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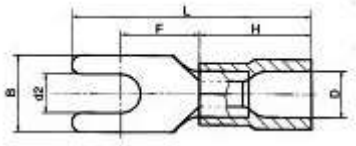
DC input voltage range: -36~-76V(for DC-48V)
AC input voltage range: 100~240 VAC, 50~60 Hz

DC Power supply: When you connect DC power supply, handle it very carefully. Make sure you connect the positive (+) and negative (-) connections properly, positive supply to the positive input and negative supply to the negative input. If damage is caused by the user due to improper connections and the product does not work properly or malfunctions, The manufacturer is not liable for repairs or replacement of the unit. After connecting the DC power cord to the unit, turn on the power switch on the rear panel. If LCD on the front panel turns on, the system electric power supply is normal (OK).

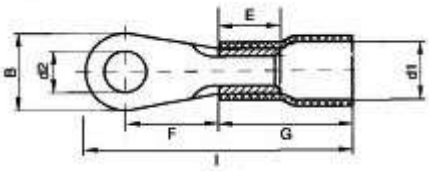
DC connector dimensions
Below are the specifications on the DC connectors:

● FORK-TYPE
• Material : Electrolytic Copper
• Surface : Tin plated
• Insulation : Polyvinyl Chloride



Wire Range		Stud Size	Dimension (mm)						
AWG	㎟		d_2	B	L	F	d_1	G	T
22~16	1.25	3	3.3	5.9	19.0	4.5	4.2	10.0	0.65

● RING-TYPE
• Material : Electrolytic Copper
• Surface : Tin plated
• Insulation : Polyvinyl Chloride



Wire Range		Stud Size	Dimension (mm)							
AWG	㎟		d_2	B	L	F	d_1	G	E	T
22~16	1.25	3	3.2	5.4	16.3	4.0	4.2	10.0	5.0	0.65

AC Power Supply: There is a fuse in the AC power socket. After connecting the AC power cord to the unit, turn on the power switch on the rear panel. If LCD on the front panel turns on, the system electric power supply is normal (OK).
If LCD does not come on, you need to check the power-in cord and then the AC power fuse.

2.4 How to connect the optical cable

The Shelf Type EDFA supports only SC/APC optical connectors.
According to the users requirements connect the optical cable to the input and the output optical adapters on the front panel of the Shelf Type EDFA.

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3 DESCRIPTION

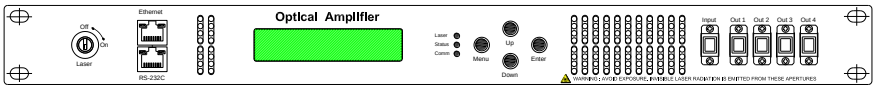
3.1 Summary

In this chapter, general information about the front and rear panels of the Shelf type EDFA are explained. The individual switches and connections will be introduced.

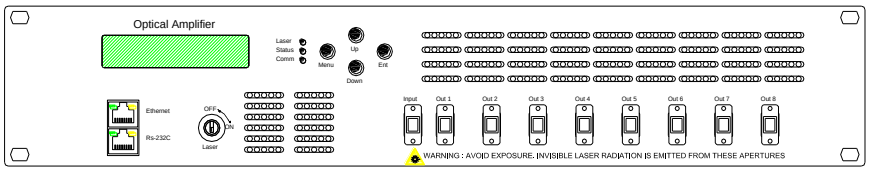
3.2 Panel Description

3.2.1 Front Panel

Figure 2 shows the front panel of the Shelf Type EDFA. The components are: an LCD capable of 2×20 letters for reading the menu states, 4 menu control switches for selecting the LCD menus, a Laser ON/OFF key switch, an EDFA state indicating LED and optical adapter cassette.



(a) 1U Shelf



(b) 2U Shelf

Figure 2. Front Panel

- **Laser On/Off Key Switch**

Table 2. Laser On/OFF Key Switch

Conditions	Performance
ON	Operate EDFA normally
OFF	Forcefully turn off the EDFA output power

- **Control Switch**

Table 3. Control Switch

Switch	Performance
MENU	Enter the menu or move the previous menu
ENTER	Apply the current menu
UP/DOWN	Move the menu items

- **LED state on the front panel**

Table 4. LED State

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Condition	Color	Performance
Laser	Green	Pump Lasers On
	Red	Pump Lasers Off
Status	Green	Normal Operation (No Alarm)
	Red	LOS Alarm / LOP Alarm
	Yellow	Bias / Temp / Case Temp/ Power / FAN Alarm
Comm	Blue	Ethernet Link On

- **Optical Connection Port on the front panel**

Table 5. Optical Connection Port

Port	Performance
Input	Optical Input Port for Launching Input Signal
Out1~4	Optical Output Port for Amplified Signal

- **Communication Port on the front panel**

Table 6. Communication Terminal Port

Port	Performance
Ethernet	Ethernet Communication Port for SNMP Monitor and Control
RS-232C	Serial Communication Port for RS-232C Monitor and Control

3.2.2 LED State Information

- LOS (Loss of Signal) Alarm

When the input optical signal power to the EDFA is lower than the minimum input conditions, the color of status LED changes green to red (see the TEST REPORT). The threshold for triggering the loss of input signal alarm is set below the minimum optical input level.

If the LOS alarm is activated the EDFA automatically changes to the Laser Shutdown state, the output power is turned off.

In response to a loss of input signal, the bias current of the pump laser diode goes into a shutdown state to prevent the development of dangerous laser diode operation conditions. If laser shutdown does not occur, the pump laser diode can be damaged.

This condition is automatically reset when the input power is restored to a power above the alarm threshold for the EDFA. The EDFA returns to its normal state, the color of status LED changes red to green, and the Laser ON state condition returns.

- LOP(Loss of Output Power) Alarm

When the optical output power of the EDFA is lower than the reference power, the color of status LED changes green to red (see the TEST REPORT). This level is commonly 3dB below the reference output power.

If the Laser OFF state is selected from the LCD menu, the color of status LED changes

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green to red.

The LOP alarm turns off when the output optical power of the EDFA is normal and the color of status LED changes red to green.

- BIAS Alarm

The Pump Laser Diode provides pumping energy to the Erbium Doped Fiber in the EDFA. The pumping power of the Pump Laser Diode is controlled by applying a bias current. If the bias current of the pump laser diode is loaded above 95% of the end-of-life (EOL) value, the pump bias current alarm is activated. The EOL bias current is defined as 120% of the beginning-of-life (BOL) bias current. The pump laser diode driver is limited to never exceed the EOL bias level. This is an indicating LED for an over current condition of the Pump Laser Diode bias current.

If the BIAS alarm is activated, the color of status LED changes green to yellow.

- TEMP Alarm

The internal temperature of the Pump Laser Diode must be kept the operating range. If the internal temperature of the Pump Laser Diode goes outside of the operational range, the TEMP alarm is activated.

If the TEMP alarm signal is activated, the color of status LED changes green to yellow.

- POWER Alarm

The voltage of power supply must be kept the operating range. If the voltage of power supply goes outside of the operational range, the POWER alarm is activated.

If the POWER alarm signal is activated, the color of status LED changes green to yellow.

- FAN Alarm

The fans must be kept the operating. If the fans are not operated, the FAN alarm is activated.

If the FAN alarm signal is activated, the color of status LED changes green to yellow.

3.2.3 Rear Panel

The rear panel of the Shelf Type EDFA consists of two pluggable type power modules and two fans.

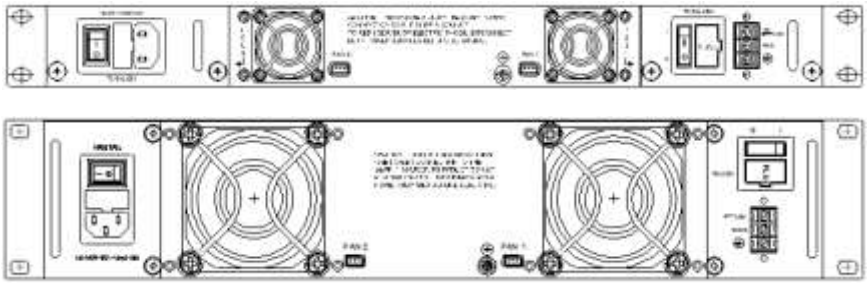

Figure 3. Rear Panel

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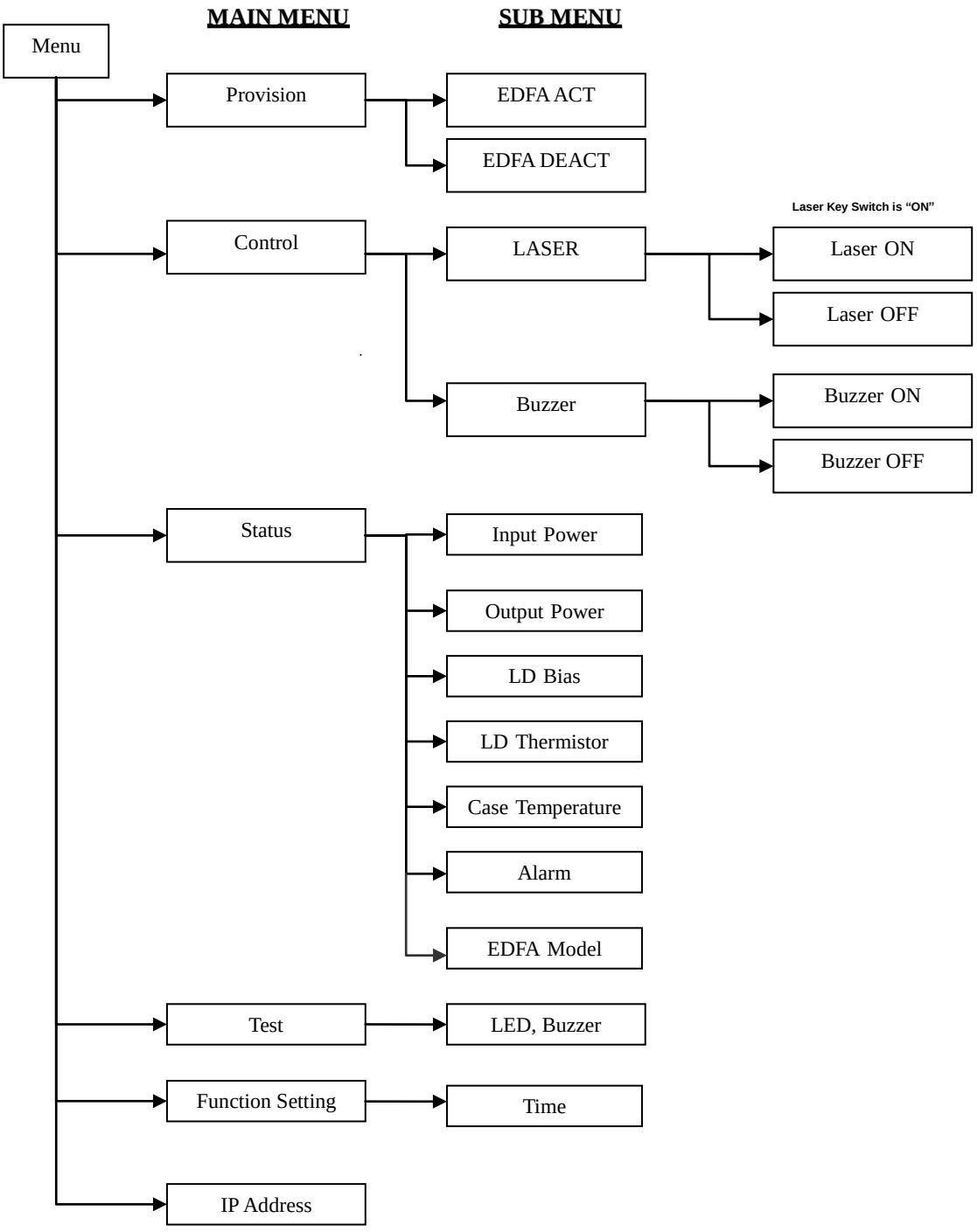
4 OPERATION

4.1 Summary

In this chapter, the operation of the EDFA using the LCD menu will be explained. The diagram below shows the operational menu tree selectable.



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4.2 LCD Operation

The functions of the Shelf Type EDFA are supported by selecting the LCD Menu switch on the front panel. If an electric power is applied, the initial display of the LCD display is as follows.

WARNING: In all LCD menus if you do not select a menu switch for about 15 seconds, the menu automatically returns to the previous menu state.

4.2.1 Menu Selects

The main menu is Provision, Control, Status, Test, Function Setting, **IP Address**. You can select any menu by the Menu switch.

The procedure of selection in the MAIN MENU is as follows:

Push the Menu switch on the start screen.

The LCD display is changed to the next screen and then the cursor is on the "Provision" menu.

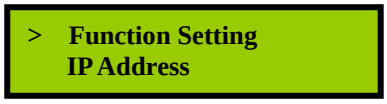
If you push the Down switch, the cursor moves to the "Control" menu.

With the cursor placed on the menu "Control", if you push the Down switch, the LCD screen changes and the cursor moves to the next menu, "Status".

With the cursor on the menu "Status," push the Down switch, the cursor moves to the "Test" menu.

From the above screen push the Down switch.

The cursor moves to the "Function Setting" menu, changing the LCD screen.



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In this condition MAIN MENU is finished.

4.2.2 Provision menu

User is able to control the operational state of the EDFA in the Provision menu. It is the menu for selecting activate (ACT) and deactivate (DEACT) operational states of the EDFA.

- Provision menu

LCD display is changed to the next screen and then the cursor is on the "Provision" menu.

From the cursor on the "Provision" if you push the Enter switch, the cursor moves from the Provision Menu to the SUB MENU.

The first line of the above screen indicates the current state of the EDFA.

The initial state of the Provision menu depends on the setting state.

If you want to change the current state, move the cursor by the Up or Down switch to the menu you wish to select.

From the current state move the cursor by Up or Down switch to the position on the "DEACT" menu.

Push the Enter switch.

The LCD screen displays the operation selected above is complete.

If you push Enter or Menu switch, the cursor moves to the "DEACT" menu. And if you do not select a menu switch for about 15 seconds, the menu automatically returns to the previous state and display.

After selecting the desired state, if you want to move to the MAIN MENU above on the screen you can change the menu with the Menu switch.

- Provision State Descriptions

Within the Provision menu the start state is the ACT (Activate) state when the power is turned on.

If you select the DEACT state at the Provision Menu, the EDFA is working an normal operation except the alarm information. The table shows the operational state of the EDFA at the Provision menu.

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Table 7. Provision Menu Descriptions

ACT State	DEACT State
EDFA: normal operation	EDFA: normal operation Status LED: Green (Alarm information is not detected)

4.2.3 Control

In the Control Menu, the optical output power of the EDFA can be controlled by Laser ON or Laser OFF. Also you can select the Buzzer sound in the Buzzer Control menu.

From the MAIN MENU using the Menu switch move the cursor to the "Control".

If you push Enter switch, the cursor moves to the "LASER" menu.

- Laser ON

From the below screen the first line indicates the current selected laser state of the EDFA.

If you want to select a different state from your current laser state, using the Up or Down switch, move the cursor to the menu that contains the state you wish to select.

-

To activate the output of the EDFA normally, put the cursor on the LASER ON position. Push the ENTER Switch (Laser Key switch is ON state).

If the Laser Key switch is OFF state, Laser On/Off is not changed, it remains the same state.

Push

Enter or Menu switch.

If you want to turn off the output of the EDFA, push the Enter switch to move the cursor to the "OFF" position.

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In this state push the ENTER switch.

Note: When the Laser is selected the "Off", the output of the EDFA also turns off and the Laser LED becomes red.

■ Buzzer ON

If an alarm has activated on the EDFA, Buzzer sound is activated. You will hear a beeping sound. As soon as the alarm condition of the EDFA is removed, the Buzzer sound automatically stops.

From the below screen the first line indicates the current selected buzzer state of the EDFA.

If you want to select a state different from your current buzzer state, using the Up or Down switch, move the cursor to the menu that contains the state you wish to select.

Push the ENTER switch

If you want to turn off the buzzer, push the Enter switch to move the cursor to the "OFF" position.

In this state push the ENTER switch.

When the Buzzer OFF is selected and the EDFA alarm is activated, the Buzzer sound is not activated.

4.2.4 Status

In the Status menu you are able to monitor the operational state of the EDFA.

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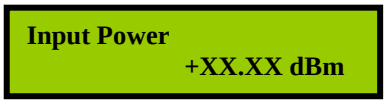
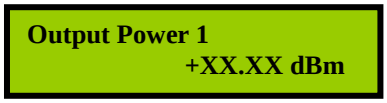
If you push the Enter switch, the cursor moves to the "Input Power" menu. The Input Power is the optical input power.

Input Power is displayed.

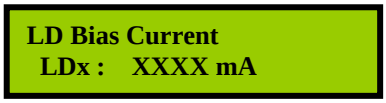


The Output Power is the EDFA output power monitoring.
The Output Power is displayed the EDFA output power of several ports



The LD Bias Current is the bias current of the pump laser diode.

The unit of LD Bias Current is [mA]. The x of LDx is the number of used laser diode.



The LD Thermistor is the pump laser diode temperature. The unit is centigrade [℃].

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The Temperature is the EDFA module temperature. The unit is centigrade [℃].

Using the Alarm menu you are able to check the EDFA Alarms.

To move another alarm state, push Up/Down switch.

…

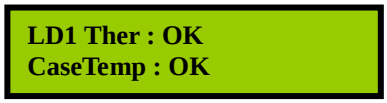

Table 8. Alarm Descriptions

Name	Variable	Descriptions
CaseTemp	Case Temperature	■ Shows the temperature state of the EDFA module. (OK: Normal, FAIL: Abnormal)
IPM	Input Power	■ Shows the input optical signal power of the EDFA. (OK: Normal, FAIL: Abnormal)
OPM	Output Power	■ Shows the output optical power of the EDFA. (OK: Normal, FAIL: Abnormal)
POWER 1	Power Supply 1	■ Shows the Power Supply state of the EDFA module. (OK: Normal, FAIL: Abnormal)
POWER 2	Power Supply 2	■ Shows the Power Supply state of the EDFA module. (OK: Normal, FAIL: Abnormal)
FAN 1	Fan1	■ Shows the FAN state of the EDFA module (OK: Normal, FAIL: Abnormal)
FAN 2	Fan2	■ Shows the FAN state of the EDFA module (OK: Normal, FAIL: Abnormal)
LD1 BIAS	Current	■ Shows the state of the Pump Laser Diode Bias current. (OK: Normal, FAIL: Abnormal)
LD1 THER	Thermistor	■ Shows the temperature state of the Pump Laser Diode. (OK: Normal, FAIL: Abnormal)

EDFA Model Name is the EDFA model name of built in the Shelf.

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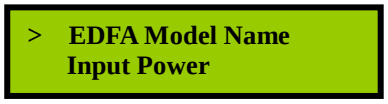

4.2.5 Test

From the Test menu you are able to test the LED, Buzzer.

If you push the Enter switch, the cursor moves to the "LED Test" menu. In the LED Test menu the operating state of all the LEDs can be checked.

If you push the Down switch, the cursor moves to the "Buzzer Test" menu. Then if you push the Down switch, the operating state of the Buzzer can be checked.

4.2.6 Function Setting

The Function Setting menu is Time.

The timer setting procedure for the internal timer is as follows:

In the below screen the Current Time indicates the present date and time.

In the Setting Time Menu, you can change the date and time to the values you need. Using the Up/Down, Enter switch move the cursor to the position that you want to change.

If you push the Down switch, the cursor moves to another position. And Up switch change the time value

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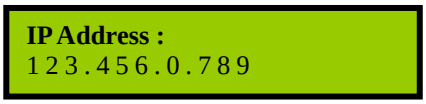
If you push the Enter switch, the time value is stored.

4.2.7 IP Address

The IP Address menu is showed IP Address of network.



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5 INTERFACE

5.1 Command Line Interface (CLI)

User can monitor or control EDFA through Ethernet port or COM port.

ADMIN and USER accounts are established separately for different access priorities. ADMIN account holder can set passwords for both ADMIN and USER accounts. In addition, the task of administrative work, such as network connection, monitor and control of EDFA are to be performed under ADMIN account.

USER account holder, usually equipment operator, is allowed to monitor EDFA's current status.

5.1.1 Commands

Information on how to set arguments of each Command is provided after a Command followed by Enter key.

? : Show available Commands in CLI with description for user's reference.

ver: Display basic hardware information on EDFA.

cls: Clear the console screen.

ping: Check connection of equipment to which an IP address is assigned.

logout : Log out from ADMIN or USER account. Not available for Telnet connection.

ip: **IP address.** Key information for Telnet, SNMP, or TCP/IP connection.

subnetmask: **Subnetmask address.** Key information for Telnet, SNMP, or TCP/IP connection.

gateway: **Gateway address.** Key information for Telnet, SNMP, or TCP/IP connection.

reset: Reset to factory default setup. Reset the network connection due to network reconfiguration or any other network connection problems. Operation of optical amplifier is not affected by this command.

mpu : Main Process Unit configuration as well as setup view and confirmation.

ofau : OFAU (Optical Fiber Amplifier Unit, amplifier module in side shelf-type EDFA or amplifier module card for rack-type EDFA) configuration as well as setup view and confirmation.

snmp : SNMP configuration as well as setup view and confirmation.

Command Execution Privilege		
command	ADMIN	USER
ver	O	O
cls	O	O
ping	O	O
logout	O	O
ip	Read/Write	Read Only
subnetmask	Read/Write	Read Only

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gateway	Read/Write	Read Only
reset	O	O
mpu	Read/Write	Read Only
otu	Read/Write	Read Only
ofau	Read/Write	Read Only
snmp	Read/Write	Read Only
shelf	Read/Write	Read Only
ntp	Read/Write	Read Only

5.1.1.1 VER

Software version information.

ex)

```
ADMIN:> ver

************************************************************
* Optical Amplifier Shelf System                           *
*                                                          *
*                        SNMP Board ver 1.0 for pxa270     *
*                                                          *
*     S/W ver : 01.01.02.00          Update : Jun 13 2014  *
************************************************************
```

5.1.1.2 CLS

Clear console screen. pin

5.1.1.3 PING

Confirm IP address to see if the IP address is assigned to any physical device.

ex)

```
ADMIN:> ping 192.168.0.1
PING 192.168.0.1 (192.168.0.1): 56 data bytes
64 bytes from 192.168.0.1: icmp_seq=0 ttl=64 time=2.3 ms
64 bytes from 192.168.0.1: icmp_seq=1 ttl=64 time=0.9 ms
64 bytes from 192.168.0.1: icmp_seq=2 ttl=64 time=0.9 ms
64 bytes from 192.168.0.1: icmp_seq=3 ttl=64 time=0.9 ms

--- 192.168.0.1 ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 0.9/1.2/2.3 ms
```

5.1.1.4 LOGOUT

Log out from RS-232 interface. Not applicable for SNMP connection.

5.1.1.5 IP

View or set up IP Address. Avoid IP address collision by using a unique IP address.

5.1.1.6 SUBNETMASK

View or set up SubnetMask Address. Check network connection configuration before set up.

5.1.1.7 GATEWAY

View or set up Gateway Address. Confirm Gateway address of connected network before set up.

5.1.1.8 RESET

Reset network connections for configuration change or any other needs for connection reset. OFAU operation is not affected by this command. Only network connection is to be reset.

5.1.1.9 MPU

Check MPU information and status of physical devices connected the MPU. In addition, basic set up of MPU is possible. See below for examples.

ex)

```
ADMIN:> mpu
------------------------------------------------------
Usage : mpu [ARG1] [ARG2] [ARG3]
```


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```
ARG1   : get, set
ARG2   : get - sysinfo. MPU module Information
                status. MPU module Status
                config. MPU module Configuration
                inpower. Input Power Value of MPU Module
         set - time.
                descr. MPU Description
                als. Machine All ALS Control
                buzz. MPU Buzzer Setting
ARG3   : time - Set New Time. [YYYYMMDDhhmmss]
         descr - Enter User define string.[Len:0 ~ 20]
         als - ON, OFF
         buzz - ON, OFF
-------------------------------------------------------
```

MPU SET DESCR [Len : 0 ~20]: Input MPU Description
ex) MPU SET DESCR Shelf-OFA for Node 1

MPU SET TIME [YYYYMMDDhhmmss] : Input time information for MPU. Use 14 digits to input the time information, such as [YYYYMMDDhhmmss].
ex) MPU SET TIME 20061207091830

MPU GET SYSINFO : View MPU Model Name, Description, Serial Number, Firmware Version, Hardware Version.
ex)

```
ADMIN:> mpu get sysinfo
-------------------------------------------------------
 Model Name :
 Description :
 Serial Number :
 Hardware Version : 1.00
 Firmware Version : 1.00
-------------------------------------------------------
```

MPU GET_STATUS : View MPU time information.
ex)

```
ADMIN:> mpu get status
-----------------------------------------------------
   Current Time : 2012/04/06 19:56:28
 Provision (Bit) : 0x1
 Card ACT (Bit) : 0x1
 Card Alarm (Bit) : 0x0
-----------------------------------------------------
```

5.1.1.10 SHELF
Basic information of shelf system
ex)

```
ADMIN:> shelf
-------------------------------------------------------
Usage : shelf [ARG1] [ARG2] [ARG3] [ARG4]
ARG1   : get, set
ARG2   : get - info - SHELF system information
                psinfo - Power Supply Output Power
                faninfo - FAN status
                alarm - Now, all alarm value of shelf system
                systh - Alarm threshold value of shelf system
                log - System log information
         set - psen - Power Supply Alarm Enable/Disable
                log - Log clear.
AGR3   : psen - index (1 ~ 2)
AGR4   : psen - value(1~F : alarm enable, 0 : alarm disable)
-------------------------------------------------------
```


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SHELF GET INFO : View Logical ID

SHELF GET PSINFO : Power supply module information
ex)

```
ADMIN:> shelf get psinfo
-----------------------------------------------------------
 # Power Supply Voltage Information.

 Power supply module count : [2]

 Power supply No.[1] type : DC -48
 PS output voltage          : 1.3[V]
 Alarm enable value(bit) : [F]

 Power supply No.[2] type : AC 100V ~ 240V
 PS output voltage          : 5.1[V]
 Alarm enable value(bit) : [F]

-----------------------------------------------------------
```

SHELF GET ALARM : All alarm status of shelf system
'1' value is OK. Another value is Not OK.
ex)

```
ADMIN:> shelf get alarm
-----------------------------------------------------------
 # Now, All alarm value of SHELF system. #

 * FAN status alarm *
 No.1 : [1]
 No.2 : [1]
 Value '1' is OK. Value '2' is FAIL.

 * Power supply status alarm *
 No.1 : [5]
 No.2 : [1]
 Value '1' is OK. Another Value is FAIL.

 * Key Als Status *
 Laser status : [2]
 Value '1' : Laser On, Value '2' : Laser Off.

 * Casetemp status alarm : [1].
 Value '1' is OK. Another Value is FAIL.

 * Optical component status alarm *
 IPM status alarm : [5]
 OPM status alarm : [5]

 * LD component status alarm *
 LD No.1
 BIAS alarm : [1]
 TEMP alarm : [1]
 LD No.2
 BIAS alarm : [1]
 TEMP alarm : [1]
 LD No.3
 BIAS alarm : [1]
 TEMP alarm : [1]
 LD No.4
 BIAS alarm : [1]
```


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```
TEMP alarm : [1]
```

SHELF GET SYSTH : Shelf system threshold value
ex)

```
ADMIN:> shelf get systh
-----------------------------------------------------
 # SHELF system threshold value

 Casetemp alarm threshold value information.
 AlarmHIHI : [750]
 AlarmHI   : [650]
 AlarmLO   : [-100]
 AlarmLOLO : [-200]

 Output voltage information of Power Supply No.1.
 AlarmHIHI : [ 53]
 AlarmHI   : [ 52]
 AlarmLO   : [ 48]
 AlarmLOLO : [ 47]

 Output voltage information of Power Supply No.2.
 AlarmHIHI : [ 53]
 AlarmHI   : [ 52]
 AlarmLO   : [ 48]
 AlarmLOLO : [ 47]

 Divide value by '10'
```

SHELF GET LOG : log information. Max log count : 100, max log index : 32767
ex)

```
ADMIN:> shelf get log
-----------------------------------------------------
# Log Count : [382] (1~1024)
 # Last log index : [382] (1~32767)

index [1] : [4f805c12:05:08:060f2b06010401ba291402060104030300:02010c] : Pwr Supply1 alarm occurred
index [2] : [4f805c85:05:08:060f2b06010401ba291402060104030300:02010d] : Pwr Supply1 alarm occurred
index [3] : [4f8067c2:05:08:060f2b06010401ba291402060104030300:02010c] : Pwr Supply1 alarm occurred
index [4] : [4f806b10:05:08:060f2b06010401ba291402060104030300:02010c] : Pwr Supply1 alarm occurred
index [5] : [4f806c37:05:08:060f2b06010401ba291402060104030300:02010d] : Pwr Supply1 alarm occurred
index [6] : [4f806c37:05:08:060f2b06010401ba291402060201040f00:0205fffffffb28] : IPM alarm occurred
index [7] : [4f806c37:05:08:06112b06010401ba2914020602010410010201:02028232] : Optical output port No.1 alarm
index [8] : [4f806c37:05:08:06112b06010401ba2914020602010410010202:02028232] : Optical output port No.2 alarm
index [9] : [4f806c37:05:08:06112b06010401ba2914020602010410010203:02028232] : Optical output port No.3 alarm
index [10] : [4f806c38:05:08:06112b06010401ba2914020602010410010204:02028232] : Optical output port No.4 alarm
index [11] : [4f80707a:05:08:060f2b06010401ba291402060104030300:02010d] : Pwr Supply1 alarm occurred
index [12] : [4f80707a:05:08:060f2b06010401ba291402060201040f00:0205fffffffb28] : IPM alarm occurred
index [13] : [4f80707a:05:08:06112b06010401ba2914020602010410010201:02028232] : Optical output port No.1 alarm
```

SHELF SET LOG : log information.clear

Ex)

```
ADMIN:> shelf set log
-----------------------------------------------------
Shelf log clear is Successful.
-----------------------------------------------------
ADMIN:> shelf get log
```


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```
------------------------------------------------------------
 # Log Count : [0] (1~1024)
 # Last log index : [0] (1~32767)
```

5.1.1.11 OFAU

Check information on OFAU and its status. In addition, basic set up of OFAU is possible. See below for examples.

ex)

```
ADMIN:> ofau
------------------------------------------------------------
Usage : ofau [ARG1] [ARG2] [ARG3]
ARG1    : get, set
ARG2    : get - sysinfo. OFAU Model Information.
                status. OFAU Module Status.
                config. OFAU Module Config Data.
                opmode. OFAU Operation Mode.
          set - opmode. OFAU Operation Mode.
                ref. Reference Output Power.
                losth. OFAU LOS Alarm Threshold.
                lopth. OFAU LOP Alarm Threshold.
ARG3    : set - opmode Card index. [1]
                ref       Card index. [1]
                losth,lopth hihi value. [0~]
ARG4    : set - opmode Value. [20:AGC or 30:APC].
                ref Value. [Reference value * 10].
                losrh,lopth hi value. [0~]
ARG5    : set - losrh,lopth lo value. [0~]
ARG6    : set - losrh,lopth lolo value. [0~]
------------------------------------------------------------
```

OFAU GET SYSINFO – View OFAU module basic Information

ex)

```
ADMIN:> ofau get sysinfo
------------------------------------------------------------
 OFAU Slot Number [1]
 Model Name : OFA-CCD-2108
 Description : EDFA
 Serial Number : 201204030001
 Firmware Version : 2.00
 Hardware    Version : 2.50
```

OFAU GET STATUS – View OFAU current status.

ex)

```
ADMIN:> ofau get status
------------------------------------------------------------
 OFAU Slot Number [1]

 EDFA Alarm Status (Bit) : 0x18
 Operation Mode : 44
 Case Temp. : 28 ['C]

 Input Power : XX.XX [dBm]

 Number of Optical Output Port : [8]
 Output Power of port No.1 : XX.XX [dBm]
 Output Power of port No.2 : XX.XX [dBm]
 Output Power of port No.3 : XX.XX [dBm]
 Output Power of port No.4 : XX.XX [dBm]

 Laser Alarm Status (Bit) : 0x0
 LD[1] ==> Bias :       0 [mA]    Temp. : 25 ['C]
```


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```
LD[2] ==> Bias :      0 [mA]   Temp. : 25 ['C]
LD[3] ==> Bias :      3 [mA]   Temp. : 24 ['C]
LD[4] ==> Bias :      0 [mA]   Temp. : 25 ['C]
```

OFAU GET CONFIG – View OFAU configuration.
ex)

```
ADMIN:> ofau get config
------------------------------------------------------------
 OFAU Slot Number [1]

 OFA input +5V Low Limit :        4.7 [V]
 OFA input +5V High Limit :       5.3 [V]

 Input Power Minimum : -12.5 [dBm]
 Input Power Maximum :   13.0 [dBm]
 Output Power Minimum :    0.0 [dBm]
 Output Power Maximum :   25.1 [dBm]

 Reference Output Power : 20.9 [dBm]

 IPM alarm threshold value information.
 ALARM HIHI : 13.0 [dBm]
 ALARM HI     : 12.0 [dBm]
 ALARM LO     : -10.0 [dBm]
 ALARM LOLO : -11.0 [dBm]

 OPM alarm threshold value information.
 ALARM HIHI : 24.0 [dBm]
 ALARM HI     : 23.0 [dBm]
 ALARM LO     : 10.0 [dBm]
 ALARM LOLO :   9.0 [dBm]

 BIAS and TEMP alarm threshold value information of LD.
 # LD NO.[1]
 BIAS ALARM HIHI :    700 [mA],   TEMP ALARM HIHI :   50.0 ['C]
 BIAS ALARM HI    :    700 [mA],   TEMP ALARM HI    :   40.0 ['C]
 BIAS ALARM LO    :      0 [mA],   TEMP ALARM LO    :   10.0 ['C]
 BIAS ALARM LOLO :      0 [mA],   TEMP ALARM LOLO :    0.0 ['C]
 # LD NO.[2]
 BIAS ALARM HIHI :    680 [mA],   TEMP ALARM HIHI :   50.0 ['C]
 BIAS ALARM HI    :    680 [mA],   TEMP ALARM HI    :   40.0 ['C]
 BIAS ALARM LO    :      0 [mA],   TEMP ALARM LO    :   10.0 ['C]
 BIAS ALARM LOLO :      0 [mA],   TEMP ALARM LOLO :    0.0 ['C]
 # LD NO.[3]
 BIAS ALARM HIHI :   1261 [mA],   TEMP ALARM HIHI :   50.0 ['C]
 BIAS ALARM HI    :   1261 [mA],   TEMP ALARM HI    :   40.0 ['C]
 BIAS ALARM LO    :      0 [mA],   TEMP ALARM LO    :   10.0 ['C]
 BIAS ALARM LOLO :      0 [mA],   TEMP ALARM LOLO :    0.0 ['C]
 # LD NO.[4]
 BIAS ALARM HIHI :   1298 [mA],   TEMP ALARM HIHI :   50.0 ['C]
 BIAS ALARM HI    :   1298 [mA],   TEMP ALARM HI    :   40.0 ['C]
 BIAS ALARM LO    :      0 [mA],   TEMP ALARM LO    :   10.0 ['C]
 BIAS ALARM LOLO :      0 [mA],   TEMP ALARM LOLO :    0.0 ['C]
```

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5.1.1.12 SNMP

Before SNMP interface connection, a few preliminary setups need to be done. SNMP interface requires Read Only Community and Read Write Community to be set up. For Trap set up, Trap IP, Trap Community, and Trap Enable/Disable need to be defined beforehand. See below for examples.

ex)

```
ADMIN:> snmp
-------------------------------------------------------
Usage : snmp [ARG1] [ARG2] [ARG3]
ARG1    : get, set
ARG2    : rocomm : Read Only Community
          rwcomm : Read Write Community
          trap : Trap Receiver Index Select
          trapen : Trap Enable
          trapcomm : Trap Community
          ver : Version Select
          admintype : ADMIN authentication Type : SNMP V3
          usertype : USER authentication Type : SNMP V3
          adminkey : ADMIN account MD5, SHA Key
          userkey : USER account MD5, SHA Key
ARG3    : rocomm : String. Limit [2 ~ 10]
          wecomm : String. Limit [2 ~ 10]
          trap : Index Number (1 ~ 5)
          trapen : Indax Number (1 ~ 5)
          trapcomm : Index Number (1 ~ 5)
          ver : Version Select Number(0 ~ 2)
                    0 - SNMP V1, V2c
                    1 - SNMP V3
                    2 - SNMP V1, V2c, V3
          admintype : Type Select. (1 ~ 3)
          usertype : Type Select. (1 ~ 3)
                    1 - NONE
                    2 - MD5
                    3 - SHA1
          adminhey : String. Limit [2 ~ 10]
          userkey : String. Limit [2 ~ 10]
ARG4    : trap : Trap Receive IP. [XXX.XXX.XXX.XXX]
          trapcomm : String. Limit [2 ~ 10]
                              trapen : String. (ON, OFF)
```

SNMP GET TRAP [Index]

ex)

```
ADMIN:> snmp get trap 1
-------------------------------------------------------
SNMP Trap IP[1] : [92.168.0.31]
```

SNMP GET ROCOMM

ex)

```
ADMIN:> snmp get rocomm
-------------------------------------------------------
SNMP Read Only Community : [public]
```

SNMP GET RWCOMM

ex)

```
ADMIN:> snmp get rocomm
-------------------------------------------------------
SNMP Read Only Community : [public]
```

SNMP GET TRAPEN [Index]

ex)

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```
ADMIN:> snmp get trapen 1
-------------------------------------------------------
SNMP Trap enable[1] : [OFF]
```

SNMP GET TRAPCOMM [Index]
ex)

```
ADMIN:> snmp get trapcomm 1
-------------------------------------------------------
SNMP Trap Community[1] : [public]
```

SNMP SET ROCOMM [string]
ex)

```
ADMIN:> snmp set rocomm public
-------------------------------------------------------
snmp setting is Successful.
```

SNMP SET RWCOMM [string]
ex)

```
ADMIN:> snmp set rwcomm private
-------------------------------------------------------
snmp setting is Successful.
```

SNMP SET TRAPEN [Index] [ON/OFF]
ex)

```
ADMIN:> snmp set trapen 1 on
-------------------------------------------------------
snmp setting is Successful.
```

SNMP SET TRAP [Index] [IP Address]
Ex)

```
ADMIN:> snmp set trap 1 92.168.0.31
-------------------------------------------------------
snmp setting is Successful.
```

This setting will be applied after reboot.

SNMP SET TRAPCOMM [Index] [string]
ex)

```
ADMIN:> snmp set trapcomm 1 public
-------------------------------------------------------
snmp setting is Successful.
```

5.1.1.13 NTP

NTP commend synchronizes the shelf unit's time from time server.
To use the NTP features, user needs to set NTP server and Time zone accordingly.

ex)

```
ADMIN:> ntp
-------------------------------------------------------
Usage : NTP [ARG1] [ARG2] [ARG3] [ARGx]
ARG1   : GET, SET
ARG2   : GET - SERVER. NTP Server IP Information
                TIMEZONNE. Time Zone
         SET - SERVER.
                TIMEZONNE. Time Zone
ARG3   : SERVER - Enter the IP1.[xxx.xxx.xxx.xxx]
         TIMEZONNE - -24 ~ +24
ARGx   : SERVER - Enter the IPx.[xxx.xxx.xxx.xxx]
-------------------------------------------------------
```

NTP SET SERVER [IP1] [IP2] ...[IP5]

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```
ADMIN:> ntp set server 141.223.182.106 172.0.0.1
------------------------------------------------------------
NTP Server Setting is Successful.
------------------------------------------------------------
```

NTP GET SERVER

```
ADMIN:> ntp get server
------------------------------------------------------------
server 141.223.182.106

server 172.0.0.1

------------------------------------------------------------
```

NTP SET TIMEZONE [GMT+9]

```
ADMIN:> ntp set timezone +9
------------------------------------------------------------
Time Zone Setting is Successful.
------------------------------------------------------------
```

NTP GET TIMEZONE

```
ADMIN:> ntp get timezone
------------------------------------------------------------
 Time zone : 9
------------------------------------------------------------
```

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5.1.2 Network Configuration

User needs to set up network configuration for the product.

Factory default IP address is 192.168.0.100. Network configuration is to be modified by either SNMP or Telnet. The modified configuration is enacted by reboot. The reset command of CLI also allows the modified configuration to be enacted.

If information on modified configuration is forgotten, then use the console to check or reset IP address. Note that network configuration can be set only by ADMIN account.

Factory Default

Item	Default Value
IP	192.168.0.100
SubnetMask	255.255.255.0
Gateway	192.168.0.1

5.1.3 SNMP Configuration

This unit supports SNMPv1, SNMPv2, and SNMPv2c. SNMPv3 will not be supported until next software upgrades. Using MIB Table for SNMP interface, GUI (Graphic User Interface) can be established for remote control and monitoring.

Read Only Community: Accounts for general users like operators who are not allowed to modify configurations. Identical to USER account in CLI.

Read/Write Community: Accounts for system administrators, who can modify product configurations. Identical to ADMIN in CLI

Trap IP: IP address for Trap Receiver which receives alarm information in an event of alarm activation. Up to 5 Trap IP can be assigned.

Trap Enable: Enable alarm transmission to Trap IP. Assign Trap IP before Trap Enable

Trap Community: The community name to be used by the device when sending traps.

Factory Default

Item	sub-command	Default Value
RO community	ROCOMM	PUBLIC
RW community	RWCOMM	PRIVATE
Trap IP	TRAP	0.0.0.0
Trap Enable	TRAPEN	OFF

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5.2 SNMP MIB Table

5.2.1 entPhysicalEntry

entityMIB OID : 1.3.6.1.2.1.47				
Name	OID	Type	Access	E.T.C
entPhysicalIndex	1.3.6.1.2.1.47.1.1.1.1.1.x	Integer32	RO	
entPhysicalDescr	1.3.6.1.2.1.47.1.1.1.1.2.x	octets	RO	
entPhysicalClass	1.3.6.1.2.1.47.1.1.1.1.5.x	Integer32	RO	
entPhysicalName	1.3.6.1.2.1.47.1.1.1.1.7.x	octets	RO	

- entPhysicalIndex : entity physical index
- entPhysicalDescr : entity physical description
- entPhysicalClass : entity physical class
- entPhysicalName : entity physical name

[x : Entiry Physical Index (1 ~ 6)]

5.2.2 propertyEntry

propertyIdent OID : 1.3.6.1.4.1.5591.1.1				
Name	OID	Type	Access	E.T.C
parameterOID	1.3.6.1.4.1.5591.1.1.1.1.1.x	object identifier	RO	
alarmEnable	1.3.6.1.4.1.5591.1.1.1.1.2.x	octets	RO	
currentAlarmState	1.3.6.1.4.1.5591.1.1.1.1.3.x	Integer32	RO	
analogAlarmHIHI	1.3.6.1.4.1.5591.1.1.1.1.4.x	Integer32	RO	
analogAlarmHI	1.3.6.1.4.1.5591.1.1.1.1.5.x	Integer32	RO	
analogAlarmLO	1.3.6.1.4.1.5591.1.1.1.1.6.x	Integer32	RO	
analogAlarmLOLO	1.3.6.1.4.1.5591.1.1.1.1.7.x	Integer32	RO	

- parameterOID : analog alarm parameter OID
- alarmEnable : analog alarm enable
- currentAlarmState : current alarm status of analog alarm parameter
- analogAlarmHIHI : analog alarm HIHI threshold value
- analogAlarmHI : analog alarm HI threshold value
- analogAlarmLO : analog alarm LO threshold value
- analogAlarmLOLO : analog alarm LOLO threshold value

[x : Analog Alarm Index (1 ~ 16)]

5.2.3 currentAlarmEntry

discretePropertyEntry OID : 1.3.6.1.4.1.5591.1.1.2.1				
Name	OID	Type	Access	E.T.C
currentAlarmOID	1.3.6.1.4.1.5591.1.1.2.1.1.1	object identifier	RO	
currnetAlarmAlarmState	1.3.6.1.4.1.5591.1.1.2.1.2.1	Integer32	RO	
currentAlarmAlarmValue	1.3.6.1.4.1.5591.1.1.2.1.3.1	Integer32	RO	

- currentAlarmOID : now, OID of generated alarm

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- currentAlarmAlarmSate : Alarm state of generated alarm
- currnetAlarmAlarmValue : Alarm value of generated alarm

5.2.4 discretePropertyEntry

discretePropertyEntry OID : 1.3.6.1.4.1.5591.1.1.3.1				
Name	OID	Type	Access	E.T.C
discreteParameterOID	1.3.6.1.4.1.5591.1.1.3.1.1.x	object identifier	RO	
discreteAlarmValue	1.3.6.1.4.1.5591.1.1.3.1.2.x	Integer32	RO	
discreteAlarmEnable	1.3.6.1.4.1.5591.1.1.3.1.3.x	Integer32	RO	
discreteAlarmState	1.3.6.1.4.1.5591.1.1.3.1.4.x	Integer32	RO	

- discreteParameterOID : discrete alarm parameter OID
- discreteAlarmValue : discrete alarm value
- discreteAlarmEnable : discrete alarm enable
- discreteAlarmState : discrete alarm status

[x : Discrete Alarm Index (1 ~ 3)]

5.2.5 alarmsIdent

alarmsIdent OID : 1.3.6.1.4.1.5591.1.2			
Name	OID	Type	Access
alarmLogNumberOfEntry	1.3.6.1.4.1.5591.1.2.1.0	Integer32	RO
alarmLogLastIndex	1.3.6.1.4.1.5591.1.2.2.0	Integer32	RO
alarmLogIndex	1.3.6.1.4.1.5591.1.2.3.1.1.x	Integer32	RO
alarmLogInformation	1.3.6.1.4.1.5591.1.2.3.1.2.x	Octets	RO
alarmLogText	1.3.6.1.4.1.5591.1.2.4.0	Octets	RO

- alarmLogNumberOfEntry : Count of log information (1~100)
- alarmLogLastIndex : Last index of log index
- alarmLogIndex : log index (1 ~ 32767)
- alarmLogInformation : alarm log information

* log information format - Time : alarm type : commonNeStatus : OID : Alarm Value

[x : Alarm log Index (1 ~ Last Index)]

5.2.6 commonIdent

commonIdent OID : 1.3.6.1.4.1.5591.1.3				
Name	OID	Type	Access	Note
commonLogicalID	1.3.6.1.4.1.5591.1.3.1.1.0	Octets	R/W	
commonVendor	1.3.6.1.4.1.5591.1.3.1.2.0	Octets	RO	
commonModelNumber	1.3.6.1.4.1.5591.1.3.1.3.0	Octets	RO	
commonSerialNumber	1.3.6.1.4.1.5591.1.3.1.4.0	Octets	RO	
commonVendorInfo	1.3.6.1.4.1.5591.1.3.1.5.0	Octets	RO	
commonReset	1.3.6.1.4.1.5591.1.3.1.7.0	Integer32	R/W	
commonAlarmDetectionControl	1.3.6.1.4.1.5591.1.3.1.8.0	Integer32	R/W	
commonNetworkAddress	1.3.6.1.4.1.5591.1.3.1.9.0	IP Address	RO	
commonTrapCommunityString	1.3.6.1.4.1.5591.1.3.1.11.0	Octets	R/W	PUBLIC

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commonInternalTemperature	1.3.6.1.4.1.5591.1.3.1.13.0	Integer32	RO	
commonTime	1.3.6.1.4.1.5591.1.3.1.14.0	Integer32	RO	
commonVarBindings	1.3.6.1.4.1.5591.1.3.1.15.0	Integer32	RO	
commonResetCause	1.3.6.1.4.1.5591.1.3.1.16.0	Integer32	RO	

- commonLogicalID : logical ID
- commonVendor : vendor
- commonModelNumber : model number
- commonSerialNumber : serial number of model
- commonVendorInfo : vendor information
- commonReset : software reset(write '1')
- commonAlarmDetectionControl : Detection control of all alarm parameter
- commonNetworkAddress : network address of system
- commonTrapCommunityString : trap community(default : public)
- commonInternalTemperature : temperature of OFA module
- commonTime : time(posix value)
- commonVarBindings : value of binding
- commonResetCause : cause of lastest reset

5.2.7 commonMulticastGroup

commonMulitcastGroup OID : 1.3.6.1.4.1.5591.1.3.3				
Name	OID	Type	Access	Note
commonMaxMulticastAddress	1.3.6.1.4.1.5591.1.3.3.1.0	Integer32	RO	
commonMulticastAddressIndex	1.3.6.1.4.1.5591.1.3.3.2.1.1.x	Integer32	RO	
commonMulticastAddressNumber	1.3.6.1.4.1.5591.1.3.3.2.1.2.x	Octets	R/W	

- commonMaxMulticastAddress : Maximum number of multicast address
- commonMulticastAddressIndex : Index multicast address
- commonMulticastAddressNumber : Address of mulitcast

[x : Mulitcast Address Index (1 ~ 5)]

5.2.8 heOpticalAmplifierGroup

heOpticalAmplifierGroup OID : 1.3.6.1.4.1.5591.1.11.1.3				
Name	OID	Type	Access	Note
heOpAmpUnitOutputStatus	1.3.6.1.4.1.5591.1.11.1.3.1.1.1.1.1.5.1	Integer32	RO	
heOpAmpUnitOnOffControl	1.3.6.1.4.1.5591.1.11.1.3.1.1.1.1.2.5.1	Integer32	RO	
heOpAmpInputIndex	1.3.6.1.4.1.5591.1.11.1.3.1.1.2.1.1.5.1	Gauge32	RO	
heOpAmpInputPower	1.3.6.1.4.1.5591.1.11.1.3.1.1.2.1.2.5.1	Integer32	RO	
heOpAmpLaserIndex	1.3.6.1.4.1.5591.1.11.1.3.1.1.3.1.1.5.x	Integer32	RO	
heOpAmpLaserTemp	1.3.6.1.4.1.5591.1.11.1.3.1.1.3.1.2.5.x	Integer32	RO	
heOpAmpLaserBiasCurrent	1.3.6.1.4.1.5591.1.11.1.3.1.1.3.1.3.5.x	Gauge32	RO	
heOpAmpOutputIndex	1.3.6.1.4.1.5591.1.11.1.3.1.1.4.1.1.5.y	Gauge32	RO	
heOpAmpOutputPower	1.3.6.1.4.1.5591.1.11.1.3.1.1.4.1.4.5.y	Integer32	RO	
heOpAmpOutputGainType	1.3.6.1.4.1.5591.1.11.1.3.1.1.4.1.5.5.y	Integer32	RO	

- heOpAmpUnitOutputStatus : output status(on/off) of optical amplifier
- heOpAmpUnitOnOffControl : output status control of optical amplifier
- heOpAmpInputIndex : index of input power

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- heOpAmpInputPower : input power value
- heOpAmpLaserIndex : index of LD
- heOpAmpLaserTemp : temp of LD
- heOpAmpLaserBiasCurrent : bias current fo LD
- heOpAmpOutputIndex : index of output power
- heOpAmpOutputPower : value of output power
- heOpAmpOutputGainType : output power gain type(AGC/APC)

[x : Pump LD Index (1 ~ 7)]
[y : Output Power Port Index (1 ~ 8)]

5.2.9 heBaseIdent

heBaseIdent OID : 1.3.6.1.4.1.5591.1.11.2				
Name	OID	Type	Access	Note
heCommonTime	1.3.6.1.4.1.5591.1.11.2.1.1.1.1.1.1.0	Octets	RO	
heCommonTemperature	1.3.6.1.4.1.5591.1.11.2.1.1.1.1.1.2.0	Integer32	RO	
heCommonSoftwareReset	1.3.6.1.4.1.5591.1.11.2.1.1.1.1.1.3.0	Integer32	RO	
heCommonAlarmDetectionControl	1.3.6.1.4.1.5591.1.11.2.1.1.1.1.1.4.0	Integer32	RO	
heCommonLogNumberOfEntries	1.3.6.1.4.1.5591.1.11.2.1.1.1.2.1	Integer32	RO	
heCommonLogLastIndex	1.3.6.1.4.1.5591.1.11.2.1.1.1.2.2	Integer32	RO	
heCommonLogIndex	1.3.6.1.4.1.5591.1.11.2.1.1.1.2.3.1.1.x	Gauge32	RO	
heCommonLogOID	1.3.6.1.4.1.5591.1.11.2.1.1.1.2.3.1.2.x	Object Identifier	RO	
heCommonLogValue	1.3.6.1.4.1.5591.1.11.2.1.1.1.2.3.1.3.x	Integer32	RO	
heCommonLogState	1.3.6.1.4.1.5591.1.11.2.1.1.1.2.3.1.4.x	Integer32	RO	
heCommonLogTime	1.3.6.1.4.1.5591.1.11.2.1.1.1.2.3.1.5.x	Octets	RO	
heCommonLogText	1.3.6.1.4.1.5591.1.11.2.1.1.1.2.3.1.6.x	Octets	RO	

- heCommonTime : time
- heCommonTemperature : internal temperature of Optical Amplifier
- heCommonSoftwareReset : software reset(write '1')
- heCommonAlarmDetectionControl : detection control of all alarm parameter
- heCommonLogNumberOfEntries : count of log information
- heCommonLogLastIndex : lastest index of log
- heCommonLogOID : OID of alarm parameter
- heCommonLogValue : alarm value
- heCommonLogState : alarm state
- heCommonLogTime activated time of alarm
- heCommonLogText : text information of alarm

[x : Log Table Index (1 ~ Last Index)]

5.2.10 hePowerSupply

hePowerSupply OID : 1.3.6.1.4.1.5591.1.11.2.2			
Name	OID	Type	Access
hePsUnitDescription	1.3.6.1.4.1.5591.1.11.2.2.1.1.1.1.3.x	Octets	RO
hePsOuputIndex	1.3.6.1.4.1.5591.1.11.2.2.1.1.2.1.1.3.x	Integer32	RO
hePsOutputVoltage	1.3.6.1.4.1.5591.1.11.2.2.1.1.2.1.2.3.x	Integer32	RO

- hePsUnitDescription : description(AC 110~220 / DC -48) of power supply module
- hePsOuputIndex : index of power supply module
- hePsOutputVoltage : output voltage of power supply module

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[x : PS Index (1 ~ 2)]

5.2.11 heFans

heFans OID : 1.3.6.1.4.1.5591.1.11.2.3			
Name	OID	Type	Access
heFanUnitAlarm	1.3.6.1.4.1.5591.1.11.2.3.1.1.1.1.1.x	Integer32	RO
heFanStatusIndex	1.3.6.1.4.1.5591.1.11.2.3.1.1.2.1.1.1.x	Gauge32	RO
heFanStatusIndex	1.3.6.1.4.1.5591.1.11.2.3.1.1.2.1.3.1.x	Integer32	RO

- heFanUnitAlarm : status of fan('1' is ok, another value is not ok)
- heFanStatusIndex : index of fan
- heFanStatusAlarm : status of fan('1' is ok, another value is not ok)

[x : FAN Index (1 ~ 2)]

5.2.12 Trap

In SNMP, SNMP Manager (console) first request data and then SNMP Agent (Shelf-OFA) response with requested data. When an alarm occurs, SNMP Trap containing the alarm information, created by SNMP Agent, is sent to SNMP Manager without request from the recipient. SNMP Manager should be prepared with SNMP Trap Receiver for this feature.

Please note that TRAP is created for every alarm activation.

TRAP format
Binding #1 : sysUpTime
Binding #2 : snmpTrapOID
Binding #3 : Alarm OID and value

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5.3 WEB Interface

Users have an option to monitor or control the EDFA through a WEB browser.

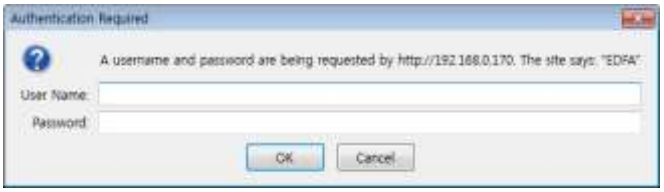
ADMIN and USER accounts are established separately for different access priorities. The ADMIN account holder can set passwords for both ADMIN and USER accounts. In addition, the task of administrative work, such as network connection, monitor and control of EDFA can be performed under the ADMIN account.

The USER account holder, usually the equipment operator, has permission to monitor the EDFA's status.

5.3.1 WEB browser

Open a web browser.
Type the amplifier IP Address in the address edit box and press Enter.

A pop-up window will prompt for User Name and Password. The default for ADMIN is user name, "admin" and password, "admin". The default for USER is user name, "user" and password, "user".
Different user levels can be set up for unlimited or restricted user privileges.



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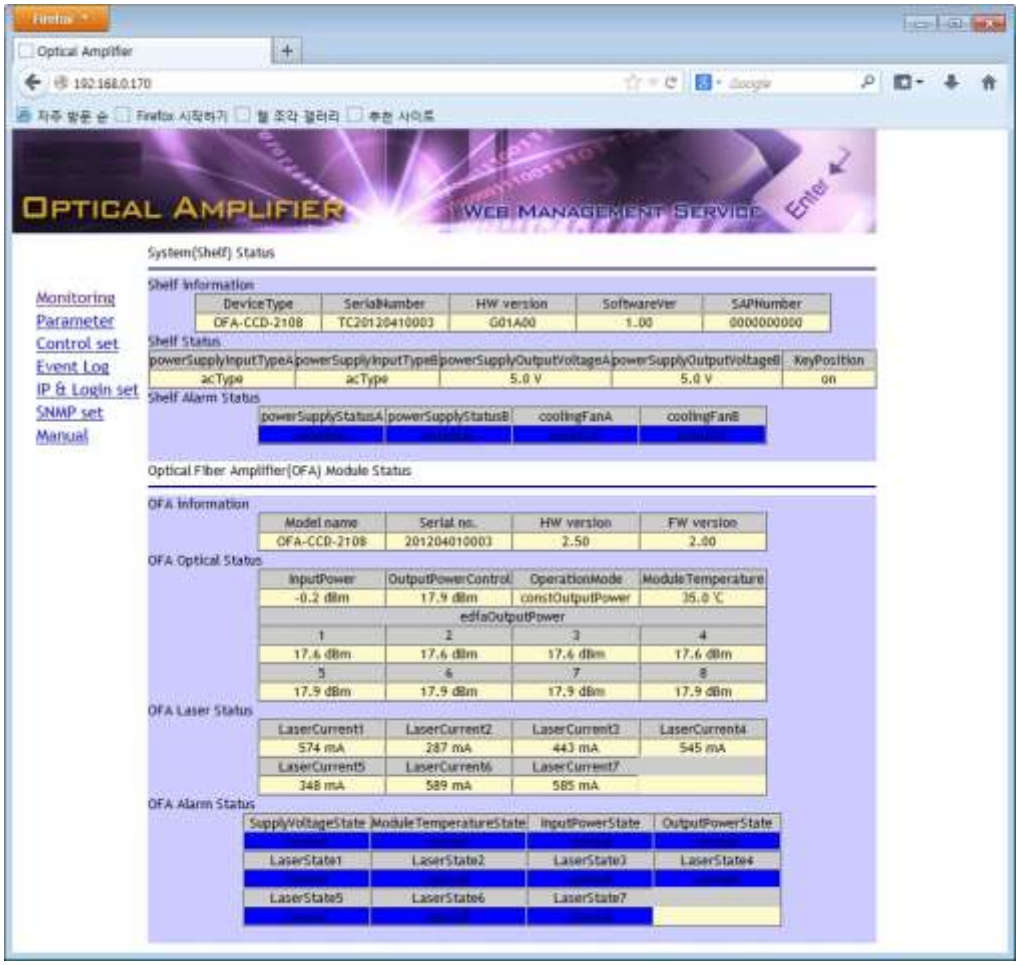
5.3.2 Monitoring

The present status of the optical amplifier can be monitored.
Status data can be automatically refreshed at a user-selectable rate. The Default refresh period is 15 seconds. The monitoring page is accessible through all of the user levels.



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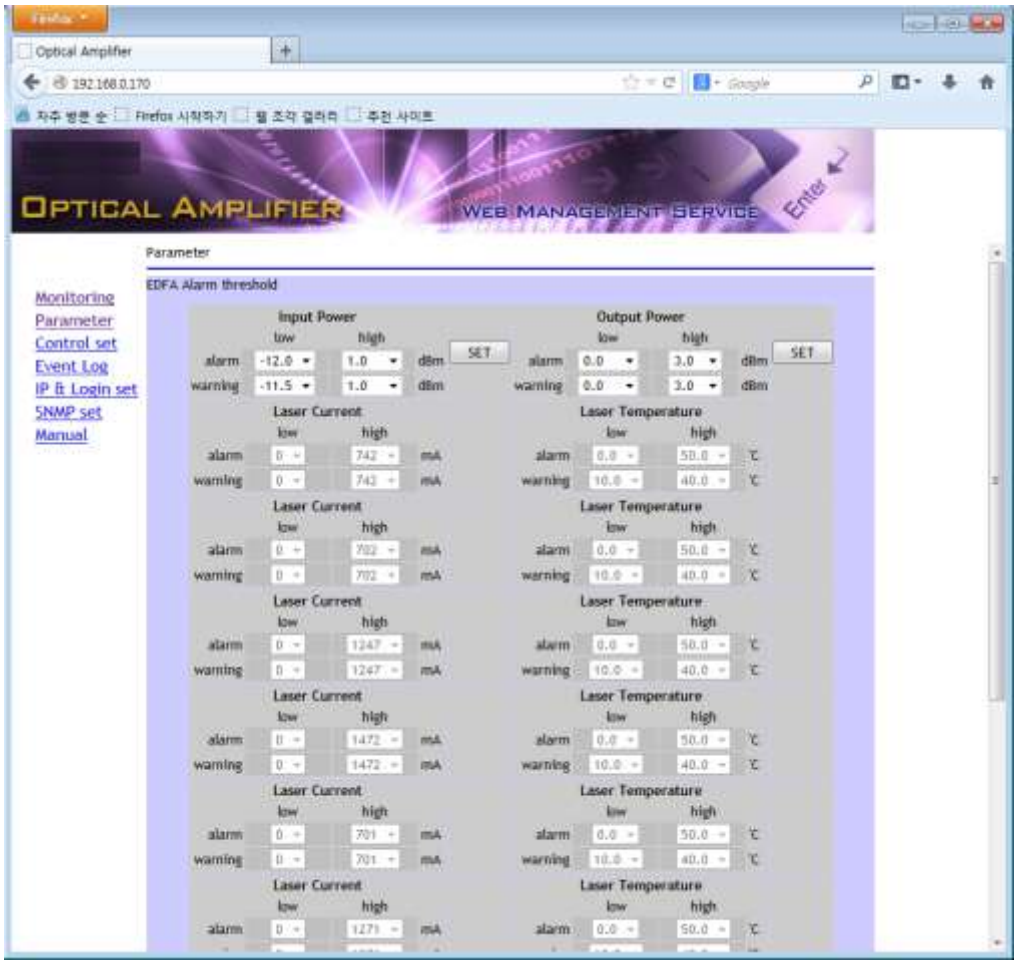
5.3.3 Parameter

The parameter page provides a view similar to the screen shot below. The Input Power and Output Power alarm threshold values are displayed and can be modified. Other elements are read only.Users should exercise caution in adjusting the threshold values away from the default, as they are critical for proper optical amplifier operation. Only the ADMIN account user can access this page.



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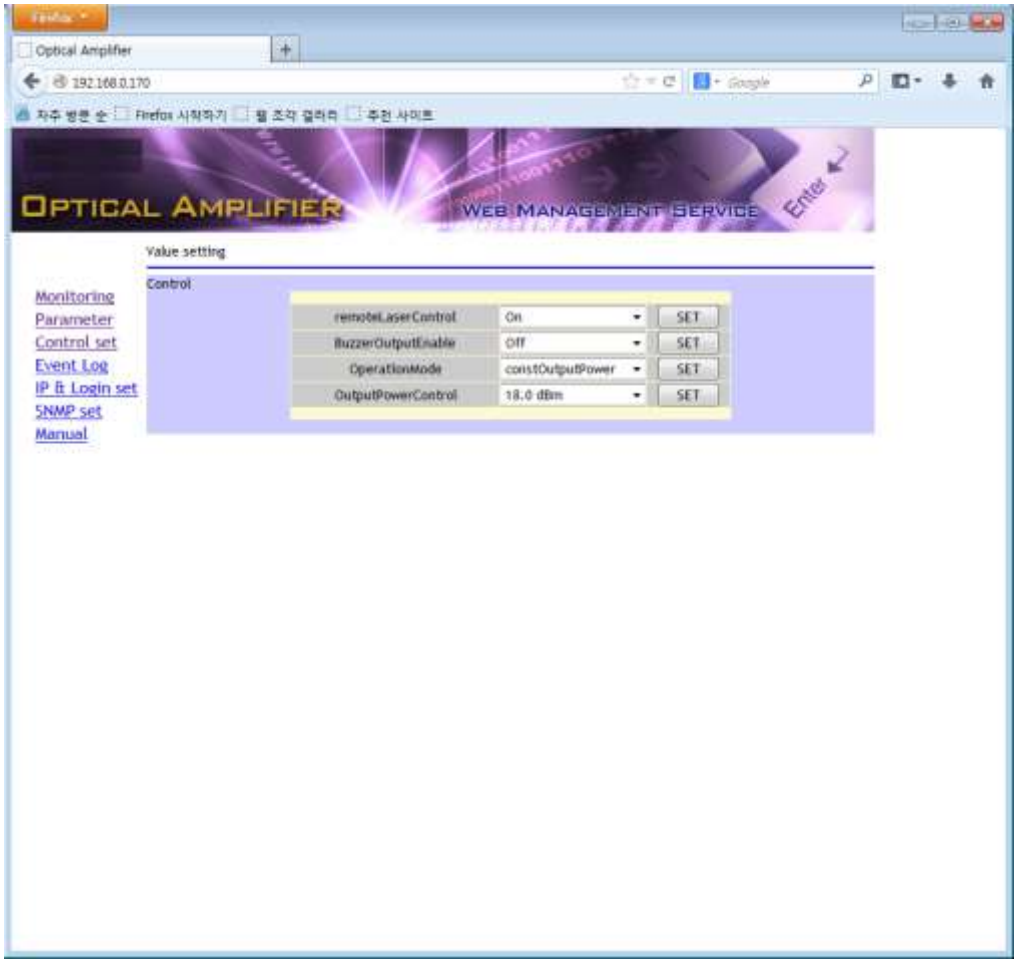
5.3.4 Control set

This page allows for various control settings to be adjusted via the convenient WEB GUI. Only the ADMIN account user can access this page.



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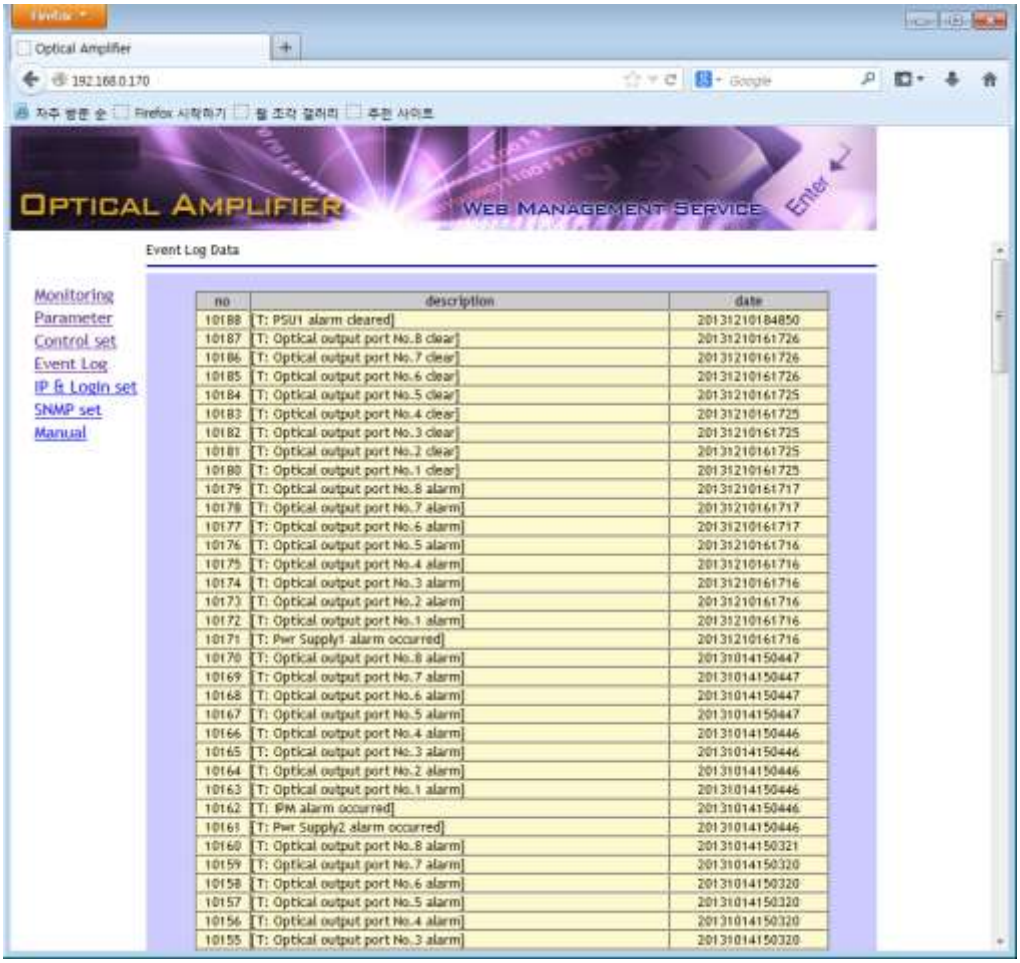
5.3.5 Event log

The Event Log page will display all of the recorded events during the optical amplifier's operation. Up to 200 events are recorded and shown in this page.
The event log page is accessible through all the user levels.



no	description	date
10188	[T: PSU1 alarm cleared]	20131210184850
10187	[T: Optical output port No.8 clear]	20131210161726
10186	[T: Optical output port No.7 clear]	20131210161726
10185	[T: Optical output port No.6 clear]	20131210161726
10184	[T: Optical output port No.5 clear]	20131210161725
10183	[T: Optical output port No.4 clear]	20131210161725
10182	[T: Optical output port No.3 clear]	20131210161725
10181	[T: Optical output port No.2 clear]	20131210161725
10180	[T: Optical output port No.1 clear]	20131210161725
10179	[T: Optical output port No.8 alarm]	20131210161717
10178	[T: Optical output port No.7 alarm]	20131210161717
10177	[T: Optical output port No.6 alarm]	20131210161717
10176	[T: Optical output port No.5 alarm]	20131210161716
10175	[T: Optical output port No.4 alarm]	20131210161716
10174	[T: Optical output port No.3 alarm]	20131210161716
10173	[T: Optical output port No.2 alarm]	20131210161716
10172	[T: Optical output port No.1 alarm]	20131210161716
10171	[T: Pwr Supply1 alarm occurred]	20131210161716
10170	[T: Optical output port No.8 alarm]	20131014150447
10169	[T: Optical output port No.7 alarm]	20131014150447
10168	[T: Optical output port No.6 alarm]	20131014150447
10167	[T: Optical output port No.5 alarm]	20131014150447
10166	[T: Optical output port No.4 alarm]	20131014150446
10165	[T: Optical output port No.3 alarm]	20131014150446
10164	[T: Optical output port No.2 alarm]	20131014150446
10163	[T: Optical output port No.1 alarm]	20131014150446
10162	[T: IPM alarm occurred]	20131014150446
10161	[T: Pwr Supply2 alarm occurred]	20131014150446
10160	[T: Optical output port No.8 alarm]	20131014150321
10159	[T: Optical output port No.7 alarm]	20131014150320
10158	[T: Optical output port No.6 alarm]	20131014150320
10157	[T: Optical output port No.5 alarm]	20131014150320
10156	[T: Optical output port No.4 alarm]	20131014150320
10155	[T: Optical output port No.3 alarm]	20131014150320

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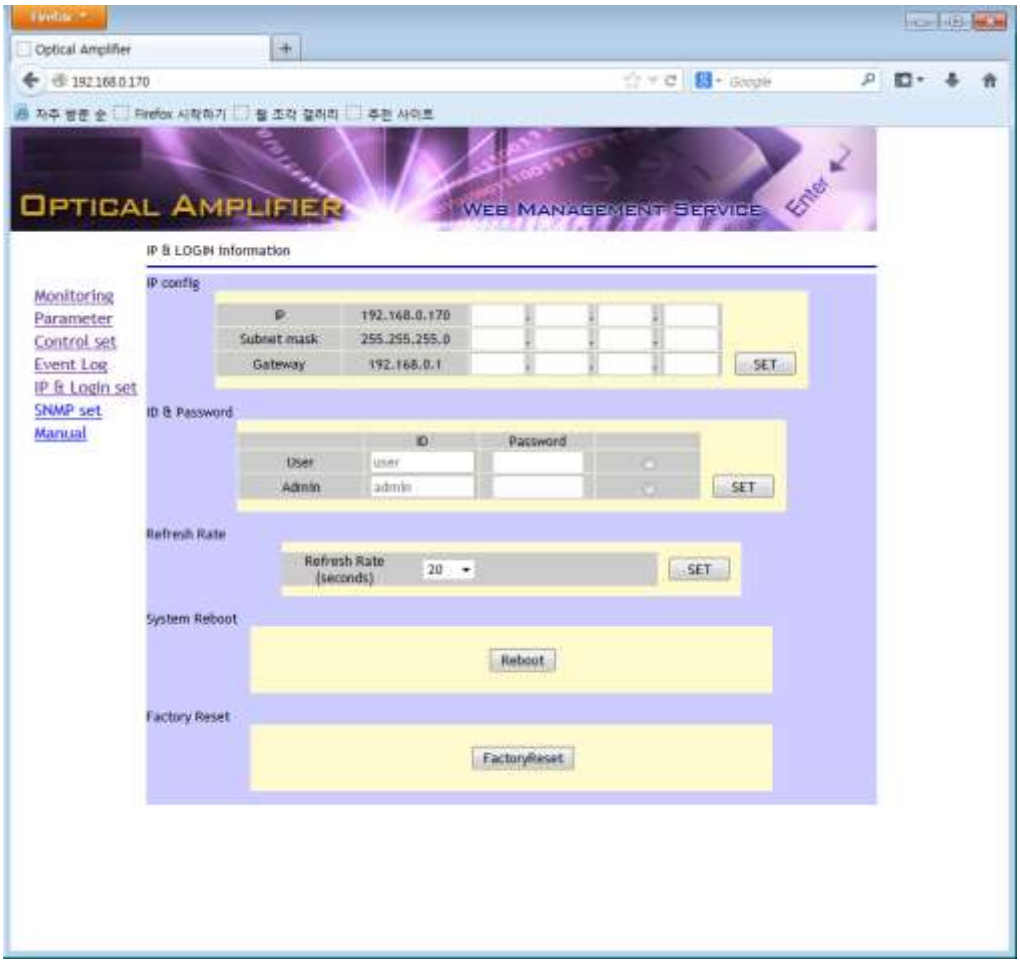
5.3.6 IP & Login set

IP, Subnet mask, and Gateway addresses can be set via this page. Passwords for Admin and User accounts can be set. A system reboot and Factory Reset can be performed. Caution should be exercised as the optical amplifier operation can be affected critically. Only ADMIN account user can access this page.



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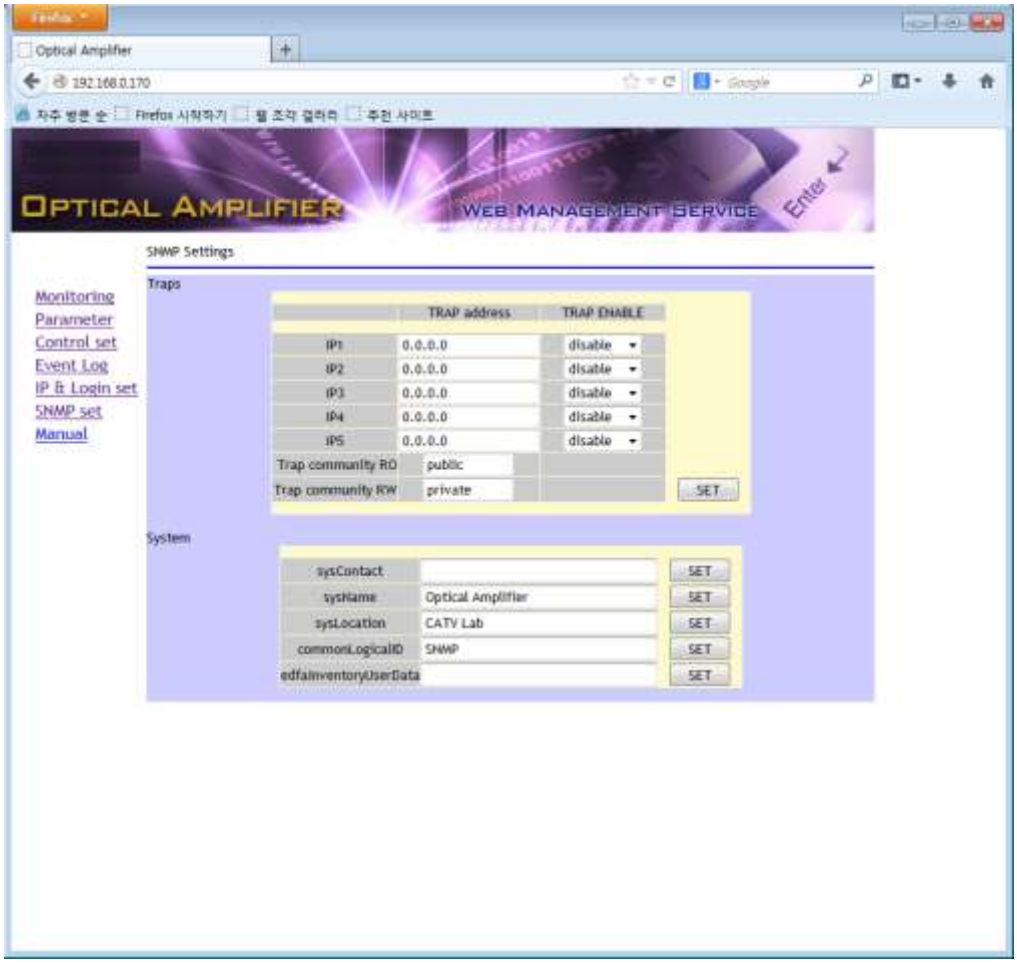
5.3.7 SNMP set

SNMP Trap IP addresses can be set and enabled/disabled. The Trap community information is case-sensitive, and should be matched to the MIB browser or NMS settings that is communicating with the device. Only the ADMIN account user can access this page.



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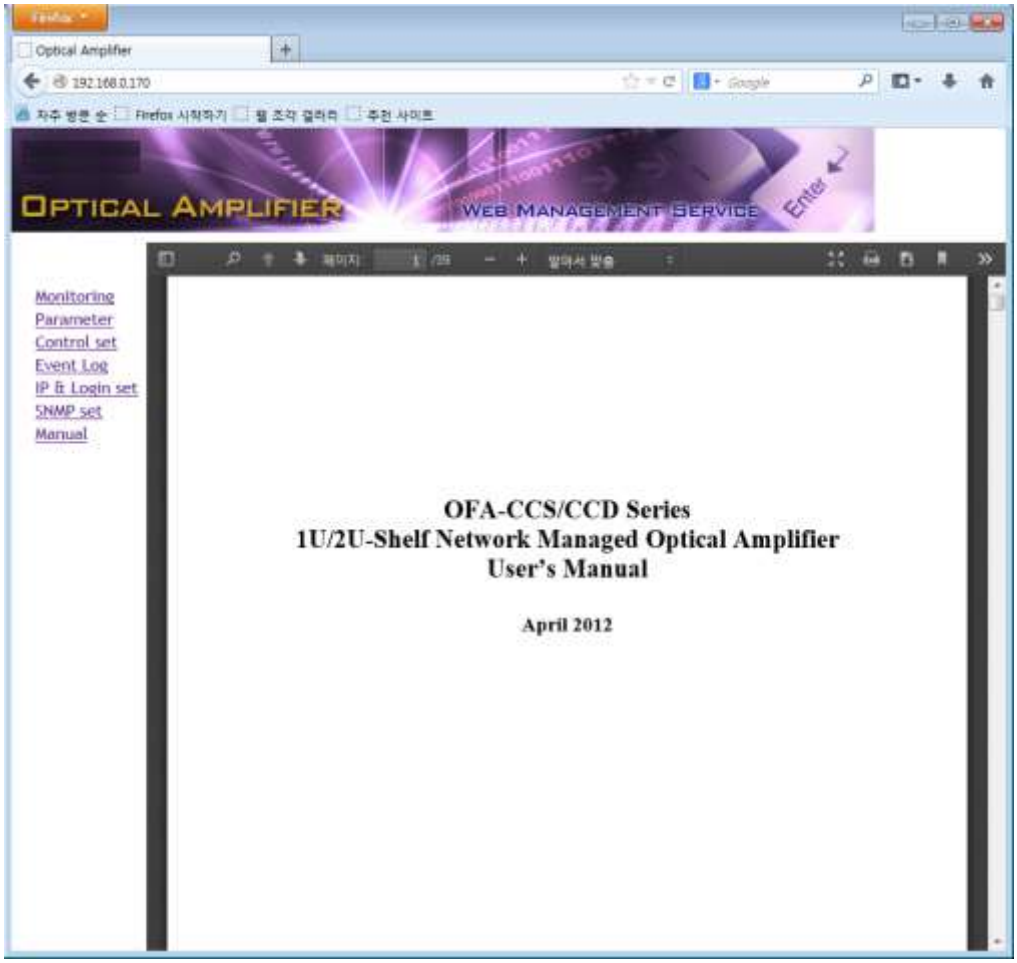
5.3.8 Manual

The user's manual in .PDF format is resident on the amplifier and available via the web GUI for convenience. This link is accessible through all the user levels.



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6 PERFORMANCE CHECK

6.1 Precautions for Testing

In this chapter after completing installation of the Shelf Type EDFA the proper operation, power supply procedures, monitor connection, start test method, and other instructions are explained. Before applying power to the Shelf Type EDFA check the Optical cable connections on the rear panel of the EDFA once more before turning the Power Switch on.

6.2 Power Supply

Below shows the circumstances that occur when the Shelf Type EDFA is first powered up.

- Check if the Power Switch on the front panel is in the OFF state.
- Connect power-cords to the power sockets on the rear panel.
- Turn on the Power Switch on the front panel.
- All the LED's on the front panel turn on.
- The LCD on the front panel shows the Start state.
  When the Start state of LCD ends, all the LED's on the front panel turn off and, the related LED's turn on.
- If the optical input power is normal, the EDFA stays in the "Laser ON" state.

6.3 Primary Test

6.3.1 Required Measuring Instruments

The required measuring instruments and their performances for the Primary Operation of the EDFA are in Table 10.

Table 9. The Instrument for measuring the performance

Instrument	Performance
Optical Source or Optical Transmitter	Input Optical Signal Source to the EDFA Operational wavelength 1550nm substitution
Optical Variable Attenuator	Controls the optical input power
Optical Power Meter	Measure the optical power

6.3.2 Performance Test

- Precaution

Before this test you must insure the conditions below are met.

1) You must always keep clean the surface of the optical connectors.

2) Do not look directly into the optical connector.

3) Do not wipe the surface of the optical connector during the LASER ON state of the EDFA.

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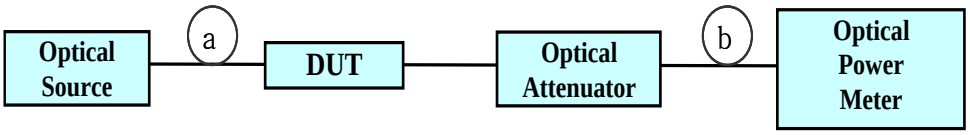

Figure 4. Shelf Type EDFA Measuring Instrument Setup

■ Test procedure of the Shelf Type EDFA

1) Connect the measuring instrument in Figure 4.

2) Check the optical signal power from the optical source (ⓐ) by using the optical power meter. The optical signal power from the optical source must be above the minimum optical input power of EDFA. The minimum optical input power and operating wavelength are described on the TEST REPORT document.

3) Make sure to check the measurable power range of the optical power meter. As the EDFA optical output power level is very high, the optical power meter may be heavily damaged if not properly adjusted.

4) Connect the output adapter of the EDFA to the optical power meter through the optical jumper cord.

5) If the optical power meter is unable to measure the optical output power of the EDFA directly you must use the optical attenuator.

6) Under normal operating conditions, that is, LASER ON state, and the optical input power condition is within the optical input power range of the EDFA, check the optical output power of the EDFA (ⓑ).

6.4 Alarm Test

The LOS Alarm of the Shelf Type EDFA occurs when the optical input power of the EDFA is lower than the minimum optical input power condition (see the TEST REPORT).

If you want to check the LOS Alarm, tune the input power of the EDFA by using the optical variable attenuator to a value below the minimum optical input signal level.

When the LOS Alarm is activated, the color of the Status LED on the front panel is changed to red.

At this time the Shelf Type EDFA automatically shifted to the Automatic Laser Shutdown (ALS) mode and the LOS Alarm is also activated.

The state information watch program of the Shelf Type EDFA stores both the activated events type and the event time.

If the Buzzer selection in the LCD menu is in the ON state, the Buzzer sound goes beep.

The Buzzer sound can be eliminated by pushing the any switch on the front panel or by cancel the Buzzer ON selection on the LCD menus.

If the Buzzer selection in the LCD menu is in the OFF state the Buzzer sound does not sound and just the state information and time values are stored. When the optical input power of the Shelf Type EDFA is normal, the LED on the front panel and the Buzzer sound automatically turn off. In this case the state information also is automatically stored.

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7 MAINTENANCE

7.1 Maintenance Cautions

If the Shelf type EDFA is out of order, a specialized expert must check the EDFA and the problem.

The expert should try to resolve the problem using the technical information provided.

The expert should follow the steps below which may fix the problem or recover the operational state.

Any other repair attempts except those explained in this chapter may cause unexpected damage or problems to the unit or installation.

Careful treatment and caution is required for all trouble shooting procedures.

7.2 Trouble Shooting Procedures

When an operator recognizes any problem on the EDFA front panel he/she should try to identify the type of problem.

When the problems occur the symptoms are shown below Table.

Table 10. In the cases alarm events and Alarm LEDs signs

Case	Laser LED	Status LED	Causes
1	**Off**	**Off**	- Electric power is not provided.
2	**Red**	**Red**	- The optical input power of the EDFA does not meet the minimum requirement.
3	**Green**	**Red**	- The optical output power of the EDFA does not meet the specified output power.
4	**Green**	**Yellow**	- The bias current of the Pump Laser Diode of the EDFA is abnormal. - Case Temp is out of the specified range - FAN fail
5	**Green to Red**	**Yellow to Red**	The internal temperature of the Pump Laser Diode of the EDFA is out of the specified range.

- Case 1: Check the power switch and power cord so that electric power is provided properly.
- Case 2: Measure whether the optical input power of the EDFA from the optical source or optical transmitter satisfies the minimum optical input power condition of the EDFA. If the optical input power of the EDFA is satisfied, clean the surface of the optical input connector of the EDFA. Remember the earlier requirement of clean optical connectors.
- Case 3: Check the Laser ON/OFF state on the Laser Control menu.
- Case 4: In this case either the capability of the Pump Laser Diode degraded or it is out of order. The EDFA needs to be repaired or replaced.
- Case 5: In this case, Status LED turns yellow at first. Then both Laser LED and Status LED turn red. This is cause by the failure that the internal temperature of the Pump Laser Diode is abnormal. It requires either adjustment or replacement.

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If you identify the problems as shown in the Table or have an unidentified problem you must stop operating the EDFA immediately. Please contact manufacturer.

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